



The first important outbreak of *Clostera anastomosis* Linnaeus 1758 (Lepidoptera; Notodontidae) on *Populus* plantations in Turkey

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Abstract: *Clostera anastomosis* Linnaeus 1758 is considered a dangerous pest of poplars and willows but this species first prefer is poplars in Turkey. *C. anastomosis* is elements of terrestrial Palearctic ecozone. Its distribution area includes from Europe, the north of Asia and Africa and the northern and central parts of the Arabian Peninsula. *C. anastomosis* has known in north and northwest Turkey since 1987. *C. anastomosis* larvae feed on leaves while severe infestations can lead to almost complete defoliation of the host plants. *C. anastomosis* is a univoltine species and has four generations per year in the Marmara region, in northwest Turkey. Emergence was seen in the first generation in May and June, the second in July and August, the third in August and September, and the last generation from September to the following May. The eggs are laid on leaf back and the number of eggs laid per female is from 350 to 650. It is noticed a mass breeding of the species *C. anastomosis* on the poplar plantations located in Bilecik and Sakarya provinces, in Marmara region, in northwest Turkey in mid-July 2015. On only this year, there were registered total defoliations over 250 ha, produced by *C. anastomosis* within the different poplar plantations. Up to now, outbreak of *C. anastomosis* hasn't been reported from Turkey. This paper is first reported of outbreak of *C. anastomosis* from Turkey.

Keywords: *Clostera anastomosis*, Poplar plantations, Turkey, Notodontidae

1. Introduction

Forest ecosystems are a system formed in a balance of animals, plants, soil, and climate. But the change in one of these elements can ruin all the stability. Insects are very important positions in animals. Insect play an important role in the deterioration of stability.

Poplar cultivation is widely performed in the Marmara region. So largest poplar plantations of Turkey are common in the Marmara region. *Clostera* (=Pygaera) *anastomosis* Linnaeus 1758 (Lep.; Notodontidae) is the indigenous species of Turkey. It is important harmful insect of poplars. This paper has been dealt with in order to report the epidemic of *C. anastomosis* in the private property poplar plantations in Sakarya province (Akyazı, Erenler and Hendek) in 2015 July.

2. Material and methods

Farmers were stated attacked, who raised poplar in private property in the vicinity of Bedirkadirbey and Bedirtahirbey villagers of Akyazı district of Sakarya province, by an unknown species of caterpillars fed on leaves of poplars in about 50 ha (500 da) poplar plantations on 27.07.2015. We started to work effected plantations area and addition to this the aerial images of the poplar plantations, taken by small-sized unmanned aerial vehicle (drone) have been obtained. During research, eggs, larvae and pupa samples of this pests were collected and transferred to the laboratory. The samples were cultured under suitable conditions. We used CAN, (1988) and ÖZAY et al. (2000), Anonymous (2017) for identificaion and taxonomy.

3. Results and discussion

It has been seen that the adults, which collected pupas on 27.07.2015, starting from July 31, 2015. We made identification this insect *Clostera anastomosis* Linnaeus 1758, (Lepidoptera Notodontidae). The wing opening of the adults was measured between 29-36 mm and the females 37-44 mm (Figure-1.A, B, C).

C. anastomosis is a native to Turkey, but its presence is known in North and Central Europe, northern Italy, the Balkans, the Scandinavian countries, Siberia, Korea, Pakistan, China and Japan. *Betula sp.*, *Populus sp.*, *Salix sp.* and *Crataegus oxyacanth* host plants for *C. anastomosis* (Arru 1965, Chararas 1972, Chaudhry and Ahmad 1974, Schwenke 1978).

C. anastomosis was first recorded on poplars in Bursa-Mustafakemalpaşa Turkey in 1987. Researches on this species in Turkey have been dealt mainly distribution level. *C. anastomosis* were recorded Adapazarı (Akyazı, Karasu and Söğütü), Bursa (Mustafakemalpaşa and Yenişehir), Edirne (Edirne and İpsala), Kocaeli (Gölcük and İzmit) and Samsun (Bafra) In these studies (Can, 1988, Yüksel, 1988; 2000). Özay et al. (2000) researched biology of *C. anastomosis* in the Marmara Region. In this research, *C. anastomosis* have 4 generations in one year in Marmara region. The first generation of *C.*

anastomosis is in May-June (duration of adulthood = 37-40 days), the second generation in July-August (34-38 days), the third generation in August-September (32-37 days), the fourth generation in September- 255-258 days). There was no report on the outbreak of *C. anastomosis* in Turkey until 2015.

C. anastomosis made first important effect and strong damage on *Populus deltoides* Bartr., which in 5-35 m length, between 2-10 years of age, extending along the Mudurnu Stream around Bedirkadirbey and Bedirtahirbey neighborhood of Akyazı district of Sakarya province, in Turkey. Other effected host plant is *Populus x euramericana* "I-214" (Salicaceae) clone of different size plantations in research area. Later on, *C. anastomosis* extended damage from the Mudurnu river to the poplar plantations in the inner regions (Figure-2).

Female of *C. anastomosis* lays its eggs in groups on the top surface leaf or tree bark of the poplar (Figure-1.D). The number of eggs in the egg packages counted between 312-593. Özay *et al.* (2000) reported that this figure was between 350 and 650, and in Croatia it was reported as 700-800 (Tomescu and Nețoiu, (2011).

Larvae of *C. anastomosis* feed on poplar leaves. First instar larvae fed only on leaf surface, but mature larvae fed with buds on shoot as well as whole leaf. Almost all of the poplars attacked by *C. anastomosis* were observed to be leafless in the epidemic areas (Figure 1.G). Colonys of larvae of *C. anastomosis* was observed to meet on stem of trees that do not have leaves in the epidemic areas (Figure 1.H).

Mature larvae has been observed into the pupae in tree bark, leaves and shoots of the plants and the living cover on ground in (Figure 1.E, F).

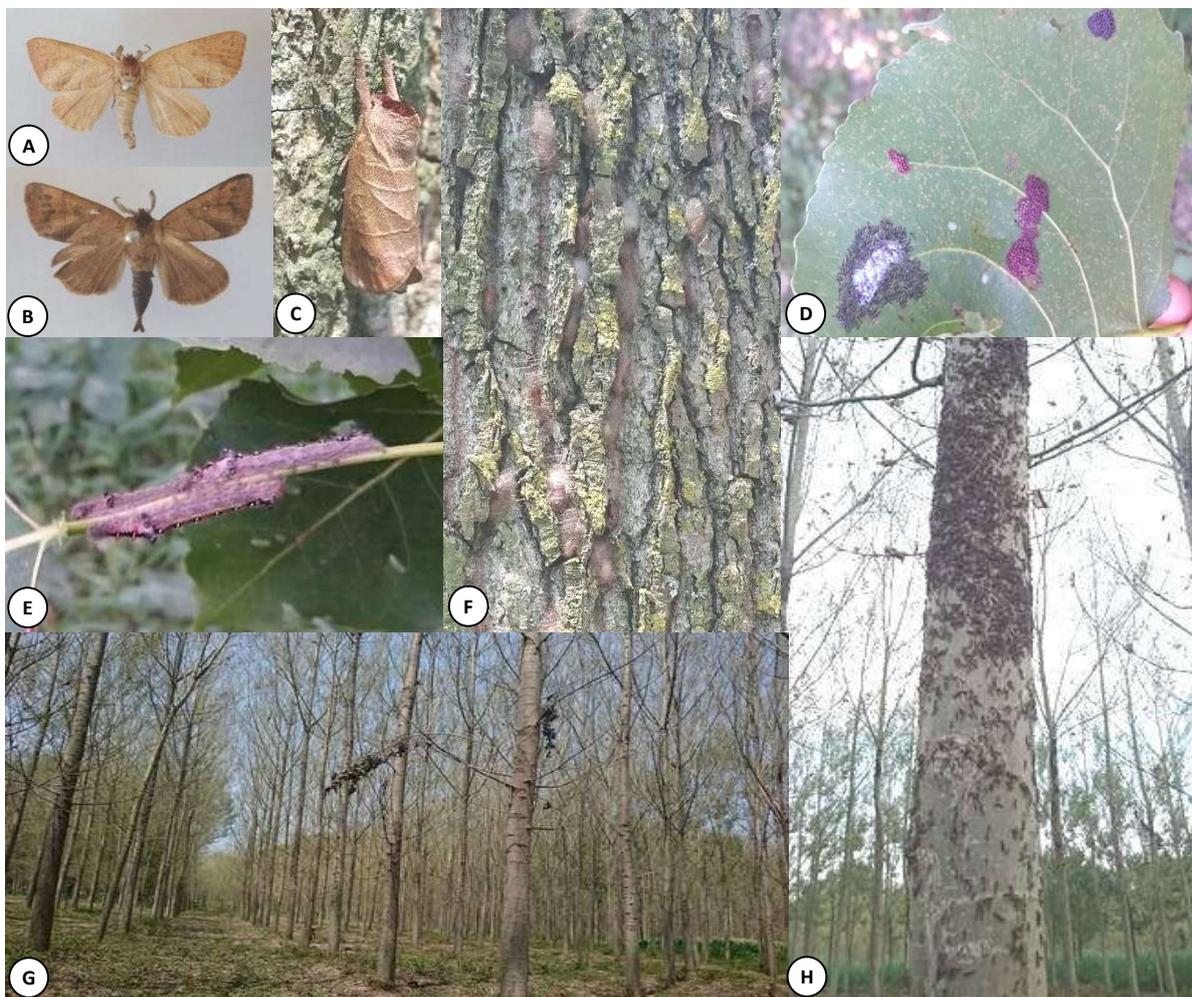


Figure-1. *Clostera anastomosis* A) Adult female, B) Adult male, C) Adult female, repose position, D) eggs on leaves, E) Mature caterpillars, F) Pupa, G) Its damage, H) caterpillar's colony on the bark in epidemic areas.

In survey performed, outbreaks of *C. anastomosis* were determined in poplar plantations, in the neighborhoods of Bedilkazancı, Gebeş, Kumköprü, Türkorman köyü, Yahyalı, Uzunçınar of Akyazı district and Çaykışla, Hasanbey, Şeyhköy of Erenler district and Beyköy, Kargalı, Uzuncaorman of Hendek district in Sakarya Province. In addition, outbreaks of *C. anastomosis* were identified in the poplar plantations which is throughout the Sakarya River in Vezirhan and Osmanlı districts of Bilecik province. On the other hand, except for epidemic areas, numerous adults and larvae of *C. anastomosis* were found on the poplars in İzmit of Kocaeli province and Altınova and Çiftlikköy districts of Yalova provinces.

Before the outbreaks, samples of the eggs, larvae, pupa and adults of *C. anastomosis* were noticed by farmers and the outbreaks of *C. anastomosis* were suddenly occurred in the epidemic areas. It is estimated that the outbreaks of *C.*

anastomosis were based on from the ownerless *Populus* sp. and *Salix* sp. along the Sakarya and Mudurnu riverbed. The outbreak, as of August 26, 2015 (in 2500-3000) is estimated to occur in the area. The epidemic has been found to occur entirely on private ownership in the poplar plantation (Figure 2).



Figure-2. General views of epidemic of *Clostera anastomosis* in populus plantations in Akyazı and Erenler district in Sakarya province.

4. Conclusions

We need the new research bio-ecological and natural enemies for the management of *C. anastomosis*. This will avoid to loss of biomass in populus plantations in the region.

On the other hand, many insects have been documented to undergo changes in their phenology due to climate change (Logan and Powell 2001). In this context, it would be appropriate to investigate whether there are deviations in the biology of *C. anastomosis*.

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